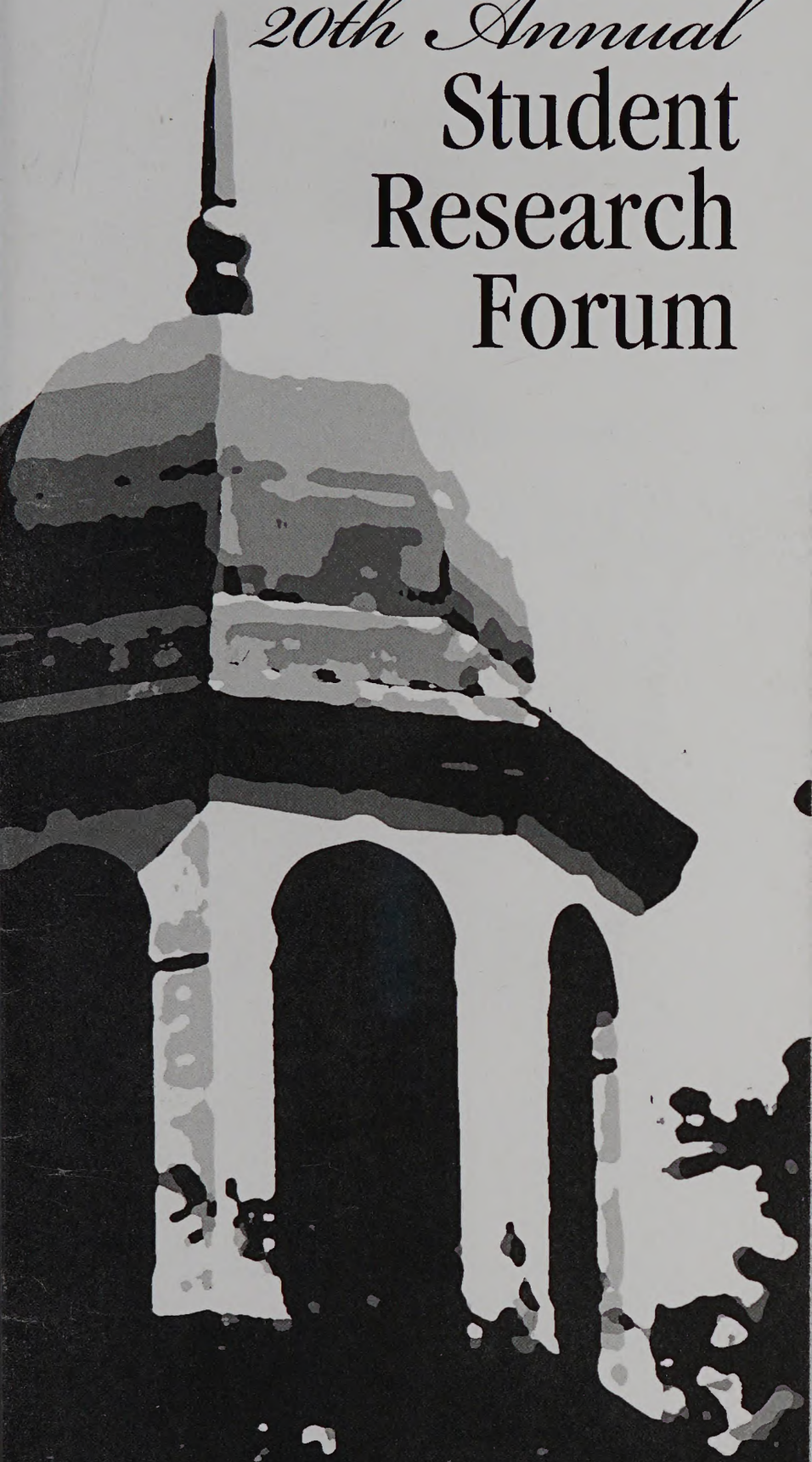
20th Annual

Student Research Forum



April 14 & 15, 2011

Centenary

20th Annual Student Research Forum

April 14 & 15, 2011

Posters
Mickle Hall
(2nd floor)
11:00 A.M.
April 14, 2011

Social Sciences and Humanities
Kilpatrick Auditorium
(Smith Building)
12:55 – 3:50 P.M.
April 15, 2011

Natural Sciences
Carlile Auditorium
(Mickle Hall first floor)
1:25 – 3:50 P.M.
April 15, 2011

20th Annual Student Research Forum

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CENTENARY BOOK BAZAAR

AND THE PROVOST AND DEAN OF THE COLLEGE

JUDGES

DR. DAVID BIELER ..... *Associate Professor of Geology*
DR. GREG BUTCHER ..... *Assistant Professor of Neuroscience*
DR. SCOTT CHIRHART ..... *Associate Professor of Biology*
DR. DANIEL HENDERSON ..... *Assistant Professor of Exercise Science*
DR. GEORGE NEWTOWN ..... *Professor of English*
DR. ROSS SMITH ..... *Associate Professor of Music*
DR. GLORIA WALKER ..... *Assistant Professor of Political Science*

FROM THE DIRECTOR

The annual Student Research Forum provides Centenary students an opportunity to showcase their talents and experiences. They are to be commended for their efforts and quality work.

Thank you research participants and advisers for doing the projects and presenting your workin this forum.

Judges, thank you for your time and effort.

Special thanks is expressed to the Centenary Book Bazaar for their financial support. We greatly appreciate it!

Sincere thanks is given to the Provost and Dean of Centenary , Dr. Mike Hemphill, for all of his financial support and encouragement.

Thank you Mrs. Jeannie Clements, Office of the Provost, and Ms. Sherry Heflin, Department of Marketing and Communications, for all of your work on planning the forum, designing/producing the brochure and the T-shirts, room arrangements, refreshments, etc. You are the best and much of our success is credited to you!

DR. MATTHEW WEEKS, *Director*
20th Annual Student Research Forum

POSTER PRESENTATIONS/JUDGING

* Presentation and judging will take place on Thursday, April 14th at 11:10am in Mickle Hall. In preparation of the judging, presenters should have their posters in place and ready at their assigned locations no later than 11:00am.

Jonathan Carrere ..... Biology
Matthew Blam ..... Biology
Joshua Phillips ..... Biology
Lauren Larkin ..... Biology
Laura Immenschuh ..... Biology
Marci McMahen ..... Biology
Nikki Escott ..... Biology
Randall White ..... Chemistry
Charles Madden ..... Chemistry
Kathryn Hardey ..... Computer Science, Physics
Jackson Blankstein ..... Computer Science, Neuroscience
Renée Do, et. al ..... Neuroscience
S. Kinchen, J. Kemp ..... Neuroscience
Heather Wensler, et. al ..... Neuroscience
D. Micinski, et. al ..... Neuroscience
C Redman, et. al ..... Psychology
A Shackleton, et. al ..... Psychology
Micah Goodwin ..... Political Science

ORAL PRESENTATIONS/JUDGING

* Presentation and judging will take place on Friday, April 15th. Locations and starting time vary by division.

SOCIAL SCIENCES AND HUMANITIES

in Kilpatrick Auditorium

12:55 P.M. Introduction/Welcome
1:00 P.M. Molly Adkin ..... History
1:10 P.M. Catherine Walsh ..... Religious Studies
1:20 P.M. Wesley Carlisle ..... Business/Finance/Economics

1:30 P.M.	Manoah O'Dell	Business/Finance/Economics
1:40 P.M.	Wesley Carlisle	Education, Mathematics, Biology
1:50 P.M.	Renée Do	Psychology, Neuroscience
2:00 P.M.	Sean Brazeel	Psychology
2:10 P.M.	David Micinski	Psychology
2:20 P.M.	Break	
2:30 P.M.	Aurora Owen	Psychology
2:40 P.M.	Megan Webber	Psychology
2:50 P.M.	Alicia Ivanic	Psychology
3:00 P.M.	Laila Al-Dubais	Psychology
3:10 P.M.	Jeffrey Schaffert	Psychology
3:20 P.M.	Tuaneeta Shears	Psychology
3:30 P.M.	Brandon Sepulvado	Sociology
3:40 P.M.	Costantinos Dafnis	Performing Arts

This session ends about 3:50

NATURAL SCIENCES

in Carlile Auditorium

1:25 P.M.	Introduction/Welcome	
1:30 P.M.	John Cefalu	Biochemistry
1:40 P.M.	Sunil Kaimootil	Biology
1:50 P.M.	Joshua Phillips	Biology
2:00 P.M.	Dallas Krentzel	Biology, Geology
2:10 P.M.	Erica Glidewell	Biology, Neuroscience
2:20 P.M.	Amanda Krentzel	Neuroscience
2:30 P.M.	Everett Grimley	Biophysics
2:40 P.M.	Sarah Sihvonen	Chemistry
2:50 P.M.	Kathryn Craigo	Chemistry
3:00 P.M.	Reem Abo-Zahrah	Chemistry
3:10 P.M.	Brandi Candler	Computer Science, Physics
3:20 P.M.	Aaron Otto	Physics
3:30 P.M.	Francis Petitto	Physics
3:40 P.M.	James Riley	Physics

Natural Science Oral Presentations end about 3:50 P.M.

POSTERS

METHYLIN AND DIAZEPAM ALTER AMBIENT TEMPERATURE TOLERANCE IN *GAMBUSIA AFFINIS*

JONATHAN CARRERE

Research Advisor: Dr. Beth Leuck

Department of Biology
Centenary College of Louisiana

Temperature tolerances of fish may be affected by exposure to anthropogenic chemicals, including human pharmaceuticals. This study focuses on the effects of stimulants and depressants on the critical thermal maximum (CTMax) of *Gambusia affinis* (mosquito fish) as measured by the loss of righting response. Fish were caught locally and separated into a control group, methylin (stimulant) group, diazepam (depressant) group, and a cocktail group of both pharmaceuticals. Groups were exposed to the pharmaceuticals for 24 hours, 3 weeks, and 6 weeks at a concentration of 0.2 mg/L, equivalent to the environmental concentrations of other human pharmaceuticals as stated in the literature. The CTMax was determined by exposing fish to gradually increasing water temperatures until the fish were unable to right themselves. The 24 hour exposure time yielded temperature tolerance data that were not statistically different from control data, but fish exposed to the pharmaceuticals for three and six weeks demonstrated significantly lower temperature tolerances than the control group.

TRANS-BACTERIAL PATHWAY DEPENDENCE OF KU BINDING IN E. COLI

Matt Blam[1] & Dr. Lynn Harrison[2]

[1]Department of Biology
Centenary College of Louisiana

[2]LSU Health Sciences Center-Shreveport
Shreveport, LA

Mycobacterium marinum, a bacterial infection prevalent in fish, promotes a disease similar to tuberculosis in the spleen, liver and kidney. This causes the buildup of infected macrophages and immune cells which form organized immunological complexes called granulomas. These granulomas can be found in the lungs for *M. tuberculosis* infections, whose sequence is 85% homologous to the *M. marinum* genome. Thus, *M. marinum* is a good biological representative of *M. tuberculosis* due to the similarities in DNA sequence and pathogenicity. One particular pathway, NHEJ, is present in both types of bacteria. This pathway repairs DSB in the DNA that would be fatal for a developing cell. Two proteins are essential for this pathway: Ku70/80 and Ligase D. Ku70/80 will form a heterodimer, bind to and stabilize the DNA, and then recruit Ligase D for DNA repair. Inside the Ku protein reside two cysteines that could potentially be important for the heterodimer complex, or binding to/stabilizing the DNA. Past work with *E. Coli* has shown mutations in both cysteine residues causes the Ku/Ligase D complex to lose repair activity after arabinose was induced. The goal of this research was examine repair activity after mutating one of the cysteines into serine.

SER243 IN THE ACTIVATION LOOP OF THE YCK2 CK1 PROTEIN KINASE MAY BE AN INHIBITORY PHOSPHORYLATION SITE

Joshua Phillips[1,2], Lauren Larkin[1,2], Dr. Lucy Robinson[2], & Dr. Cynthia Brame[1,2]

[1]Department of Biology
Centenary College of Louisiana

[2]LSU Health Sciences Center-Shreveport
Shreveport, LA

The casein kinase 1 (CK1) protein kinase family regulates diverse processes including chromosome segregation, vesicular trafficking, and cell division. Regulatory mechanisms controlling activity of most CK1s are unknown. Using the CK1 Yck2 from budding yeast, we tested the possibility that phosphorylation of serine 243 (S243) in the activation loop can negatively affect activity. S243 was altered to alanine (S243A) and aspartate (S243D) in a *GFP:YCK2* fusion via site-directed mutagenesis. The mutant alleles were expressed in S. cerevisiae to examine function/localization of the encoded variants. From low/high copy vectors, S243A provides normal Yck function/localization. S243D also exhibits normal localization. It supports normal growth from high copy but reduced growth from low copy. In vitro immune complex protein kinase assays using a beta-galactosidase fusion to Yck2 showed only slight differences between both variant proteins and the wild-type protein in standard conditions. We integrated the mutant alleles by gene replacement. S243A appears to provide better function than the wild-type Yck2 gene whereas S243D results in impaired growth. We plan to test in vitro activity of both variants at different temperatures to assess differences that result in altered biological activity and purify Yck2 to directly determine whether S243 is phosphorylated in cells.

INVESTIGATION OF A POTENTIAL TYROSINE PHOSPHORYLATION SITE IN THE ACTIVATION LOOP OF A YEAST CASEIN KINASE I PROTEIN KINASE

Lauren Larkin[1,2], Dr. Lucy Robinson[2], & Dr. Cynthia Brame[1,2]

[1]Department of Biology
Centenary College of Louisiana

[2]LSU Health Sciences Center-Shreveport
Shreveport, LA

Yck1/2 are essential and redundant proteins in *Saccharomyces cerevisiae*. They are members of the CK1 protein kinase family, which regulates a range of functions from chromosome segregation to circadian rhythm. Mechanisms of regulation in this family are largely unknown. We tested the hypothesis that phosphorylation of tyrosine 225 (Y225) in the Yck2 activation loop inhibits activity. Using site-directed mutagenesis, Y225 was substituted with glutamate (Y225E) and phenylalanine (Y225F) to mimic constitutive phosphorylation and dephosphorylation, respectively. The resulting mutants were analyzed *in vivo* and *in vitro*. *In vivo* growth assays demonstrated that Y225F supports growth comparable to wt Yck2; it rescued both temperature-

sensitive cells and yck1,2Δ cells, whereas the Y225E variant fails to support growth of either strain. In vitro results are consistent: the Y225F mutant is as effective as wild-type at phosphorylation of protein and peptide substrates, while Y225E is almost nonfunctional. Computer modeling of the protein's solvent accessibility showed a potential alteration in the ATP binding pocket in the Y225E protein, but not the Y225F variant. Although these results are consistent with an effect of phosphorylation of Y225 on Yck2 activity, altering this residue to other residues yielded results less consistent with this hypothesis.

THE ROLES CHOLESTEROL, RESERPINE AND THE *HEFC* EFFLUX PUMP ON *HELICOBACTER PYLORI* BILE SALT RESISTANCE

Laura Immenschuh, Elizabeth A. Trainor[1], & David J. McGee[1]

[1]LSU Health Sciences Center-Shreveport
Shreveport, LA

Helicobacter pylori, a gastric bacterial pathogen of humans, has the ability to resist bile salts, which have antimicrobial activity. These are two mechanisms of bile salt resistance, one is cholesterol-dependent and the other is dependent on the *hefC* gene encoding a putative bile salt efflux pump. To address the hypothesis that *hefC* is a bile salt efflux pump, we cultured *H.pylori* wild type (WT) or the *hefC* mutant in Ham's F-12 medium with three different serial two-fold dilutions of deoxycholatebile salt in the presence and absence of cholesterol and reserpine, an efflux pump inhibitor. Cholesterol increased the resistance of WT to deoxycholate, but reserpine experiments are still ongoing. By inhibiting an inhibitor of the HefC putative bile salt efflux pump. New theraputic strategies may be developed to treat *H. pylori*, a pathogen with increasing antibiotic resistance.

MERKEL CELL POLYOMAVIRUS URINARY SHEDDING IN PREGNANCY: A PROSPECTIVE LONGITUDINAL STUDY

Marci McMahen, Gloria B. McClure[1], J. Suzette Gardner[1],
& John A. Vanchiere, M.D., Ph.D[1]

[1]LSU Health Sciences Center-Shreveport
Shreveport, LA

The immune system is naturally suppressed during pregnancy, making pregnant women more susceptible to or more severely affected by virus infections. The recently described Merkel Cell Polyomavirus (MCPyV) is associated with Merkel Cell Carcinoma and can be found in the urine of healthy and immune compromised patients. We hypothesized that MCPyV would be found more frequently in the urine of pregnant women than in non-pregnant women due to the natural immune suppression of pregnancy. Quantitative PCR was used to determine the viral load of MCPyV in serial urine samples obtained from pregnant women at LSUHSC-S. Several specimens were positive for MCPyV. The results also show the frequency of MCPyV shedding and viral load correlated with gestational age.

MITOCHONDRIAL UNCOUPLING PROTEIN 2 (UCP2) CONTRIBUTES TO THE CHEMORESISTANCE IN HUMAN BREAST CANCER CELLS

Nicki Escott[1] & Yunfeng Zhao[2]

[1]Department of Biology
Centenary College of Louisiana

[2]Department of Pharmacology, Toxicology & Neuroscience
LSU Health Science Center

Mitochondrial uncoupling (uncoupled ATP production from electron transportation) is one factor that leads to chemoresistance in cancer cells. We aimed to study whether genipin (a UCP2 inhibitor) can sensitize chemoresistant MDA-MB231 (MB231) human breast cancer cells to doxorubicin treatment. Our results demonstrated that UCP2 is upregulated in MB231 cells compared with MCF7 (non-chemoresistant) cells, and genipin may sensitize MB231 to doxorubicin treatment using the MTT assay. Correspondingly, mitochondrial membrane potential was lower in MB231 cells compared to MCF7 cells, which showed a slight increase in the MB231 cells treated with doxorubicin and genipin. In addition, our results demonstrated that there were lower levels of reactive oxygen species (ROS) in MB231 cell compared to MCF7 cells, which were slightly increased in cells treated with genipin and doxorubicin. Doxorubicin is known to induce p53-dependent apoptosis; the expression of p53 and its target gene, Bax, was determined. The results demonstrated no Bax induction in the MB231 cells; suggesting that mutant p53 may not be activated in genepin's action.

INVESTIGATING THE PERFLUOROALKYLATION OF AROMATIC C-H BONDS OF COMPOUNDS CONTAINING CARBOXYLIC ACID AND TRIALKYLAMINE FUNCTIONAL GROUPS

Randall White, Kathryn Craigo, & Dr. Joshua Lawrence

Department of Chemistry
Centenary College of Louisiana

A compound's bioavailability and lipophilicity can be affected by the presence of trifluoromethyl functional groups. This observation has a direct application in pharmaceuticals design: binding these functional groups to pharmaceutical drugs could have important biological significance. The perfluoroalkylation procedure used in this investigation has been shown to give good yields and can be performed in air. The procedure is also relatively quick and safe. Previous studies have shown that simple arenes could be perfluoroalkylated with this procedure. Perfluoroalkylation of a protected, esterified ibuprofen derivative was successful using this method, and an isomer was isolated. This isomer was deprotected, and was utilized for in vivo studies on mice by another research group. Success was not found in isolating a perfluoroalkylated isomer of naproxen and many products were created in the synthesis. Although, perfluoroalkylated products of protected naproxen were successfully synthesized and observed by GC-MS. Attempts to separate them by column chromatography were unsuccessful

Synthesis of Archaeal-type Phospholipids with Varying Alkyl Chain Lengths

Reem Abo-Zahrah, Charles Madden, and David Brownholland,

Department of Chemistry
Centenary College of Louisiana

Bolalipids, or archaeal-type phospholipids, are unique materials which form fluid lamellar-phase membranes with enhanced stability over membranes formed from more conventional monopolar phospholipids. This enhanced stability presumably comes from 1) an ether-linkage between the glycerol backbone and the hydrophobic region of the lipid and 2) the presence of transmembrane spanning alkyl group(s). Bolalipids have demonstrated potential in applications such as lipid membrane-based biosensors, drug-, gene- and vaccine delivery vehicles, and as molecular fossils. *Despite* some recent advances; the structure-function properties of bolalipids are poorly understood. The progress towards the synthesis of two bolalipids, C_{16}BAS and C_{24}BAS, are reported. These compounds will be evaluated to help elucidate the effects of alkyl length on the physical properties of the resulting membranes. Similar synthetic strategies used to synthesize the previously generated bolalipids, C_{20}BAS and C_{32}BAS, are employed.

Development of Fire Fighting Rescue Robots in occam-pi

Kathryn Hardey[1], Molly Mattis[2], Dr. Mark Goadrich[1], & Dr. Matthew Jadud[2]

[1]Department of Mathematics
Centenary College of Louisiana

[2]Allegheney College
Meadville, PA

The objective of the Trinity College Robot Fire Fighting Contest is to build and program a robot which can maneuver itself through a basic arena, find a lit candle, and extinguish it in some way. For this project, we used the Arduino, an open source microcontroller to control the robot. To maneuver through the room, an array of IR sensors and flame detectors were installed. The arena has a basic floor plan with various door positions. Our program seeks to locate the flame by checking for these door states and reacting based on sensor input. The program is written in a programming language called occam-pi using the Plumbing library. This is a parallel language meaning all processes are handled concurrently rather than sequentially. This allows all functions of the robot – wall avoidance, flame detection, motor control, etc – to easily happen simultaneously. Through our research, we have learned how to utilize concurrent programming and how to build the electronic circuits needed for a small robot.

CONSTRUCTING A DATABASE FOR EEG HEADSETS

Jackson Blankstein

Research Advisor: Dr. Mark Goadrich

Department of Mathematics
Centenary College of Louisiana

Research involving the study of brain patterns using electroencephalography (EEG) generally requires large amounts of data to obtain any conclusive results. In order to aid this process, we are developing a online database EGBG where researchers can upload data and use simple analytic tools on these large sets of data. Our database is specifically intended for users of the Emotiv EEG headset, a low cost hardware/software bundle that enables amateurs, students, and researchers alike to have access to this normally expensive equipment. EGBG was written using the Ruby on Rails platform to construct the model along with HTML 5 tools to provide EEG data visualization, inspection and collation.

BRAIN AWARENESS WEEK AS A VEHICLE FOR UNDERGRADUATE SERVICE-LEARNING

Renée Do, Heather Wensler, Gaurav Shah, Dr. Greg Q. Butcher, & Sarah Thorne

Department of Biology
Centenary College of Louisiana

Recently, experiential service-learning (SL) opportunities in undergraduate science curricula have been truly emphasizing both components equally, such that the experiences were not simply community service projects. In 2009, Centenary College of Louisiana adapted their SL program to allow individual courses, which incorporated a community-based project into their curricula, to fulfill the SL requirement. Here we describe one such project which utilized Brain Awareness Week as the foundation of educational outreach programs. Participating undergraduate students developed interactive demonstrations that emphasized neuroscience-related concepts aimed toward educating K-12 students. These demonstrations were initially reviewed by the supervising instructor before being piloted with a test group of 5th graders. Students then incorporated their feedback into their final demonstrations, which were held during Brain Awareness Week at a local science center. Afterwards, all presenters completed a reflection paper, debriefing session, and programmatic assessment. Ninety-one percent of participating students indicated that they learned something new about the course content, their own career goals or both through this project. Additionally, 94% indicated the project added to the course overall and 45% felt the course increased their interest in taking another neuroscience course. Feedback from the teacher-partners indicated a comparable level of enthusiasm in the pilot audience

PERFLUOROALKYL ANALOGUES OF IBUPROFEN MODULATE THERMAL AND INFLAMMATORY PAIN

Samarra Kinchen, Justine Kemp, Dr. Greg Q. Butcher[1], Dr. Joshua Lawrence[2], & Dr. Scott Chirhart[1]

[1]Department of Biology
[2]Department of Chemistry
Centenary College of Louisiana

Fluorinated organic molecules comprise over 20% of pharmaceuticals and 40% of agrochemicals. The application of fluoroorganics to various biological problems has been encouraged by (1) their increased stability in vivo compared to H analogues, (2) their increased lipophilicity (membrane permeability), and (3) their use in tracking accumulation and degradation of pharmacophores. Here we present data demonstrating the efficacy of a perfluoroalkyl derivative of ibuprofen as an analgesic. Two behavioral tests were conducting to determine the effectiveness of the compound on mitigating pain induced by thermal stimuli (modified hot plate test) and inflammation (formalin test). While there was no significant difference between the negative control and an isomeric mixture of perfluoroalkyl ibuprofen analogues in the hot plate test, an isomerically pure form of the drug was found to be as effective as ibuprofen. However, both the isomeric mixture and the pure isomer of the perfluoroalkyl analogue produced a significant analgesic effect relative to ibuprofen in the formalin test. These data suggest that the location of the perfluoroalkyl group may influence interaction of ibuprofen with specific thermal nociceptors, but not those involved in inflammatory pain.

ANALGESIC AND ANTI-INFLAMMATORY EFFECTS OF A PERFLUOROALKYL DERIVATIVE OF IBUPROFEN

Heather Wensler, Amanda Krentzel Roumta Odisho, John Cefalu, & Dr. Greg. Butcher

Department of Biology
Centenary College of Louisiana

Perfluoroalkyl derivatives have been shown to have increased lipophilicity, and thus are the subject of novel analgesic development. These derivatives are developed for their ability to cross the plasma membrane more readily than their drug counterparts. Non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, are common, over-the-counter methods of relieving pain and inflammation. Their primary mechanism of action is by non-selectively inhibiting COX-1 and COX-2 enzymes, thereby preventing the conversion of arachidonic acid to prostaglandins. We hypothesized that a perfluoroalkyl derivative of ibuprofen, which has been named kraigoprofen, would have stronger antinociceptive and anti-inflammatory properties than ibuprofen. Hot plate and tale flick tests, both of which are measures of acute pain, were performed to test for analgesic effects. Additionally, a formalin test was used to determine analgesia and anti-inflammatory properties of kraigoprofen on chronic pain. A western blot was performed to examine the expression levels of COX-2, a molecular measure of inflammation.

ASSOCIATION OF THE DOPAMINE D4 RECEPTOR (DRD4) WITH POLITICAL IDEOLOGY, PERSONALITY TRAITS, AND VARIOUS DEMOGRAPHICS

David Micinski, Renée Do, Jeff Schaffert, & Dr. Greg Butcher

Department of Biology
Centenary College of Louisiana

Understanding the underlying motivations and needs of political ideologies can facilitate communication between opposing ends of the spectrum, conservatives vs. liberals. Personality aspects such as novelty seeking and compassion have been correlated with liberal ideology, whereas extraversion and sexuality have been correlated with expression of *DRD4*. Some of these traits have been associated with both liberalism and expression of *DRD4*; however, liberalism and *DRD4* have not been shown to be directly related. The researchers hypothesized that there would be a correlation between liberalism and various factors such as personality traits and demographics in humans who possess DRD4. Participants provided DNA samples via cheek swab and were asked to complete three surveys: a short demographics survey, the Social Attitudes Statement Scale (SA-II, a test designed to determined political ideology), and the Advanced Global personality test. Pearson's coefficient (r) was then calculated to determine correlations between personality factors and political ideologies, *DRD4* and personality factors, and *DRD4* and political ideologies. The presence of *DRD4* and personality traits could possibly serve as predictive factors in determining political ideology.

LOCATION AND MEMORY

Cady Redman, Jay Frazier, Shunequika Gilmore, & Charles Ray

Research Advisor: Dr. Amy Hammond

Department of Psychology
Centenary College of Louisiana

Location plays a big part into memory recall, with a large number of studies finding that when you recall something in the same place that you learned it you are likely to do better, than recalling it somewhere else (Smith & Vela, 2001). This study looks at the role of place cells in short-term memory. Participants studied three lists of words and were asked to recall the words in different locations with each participant being exposed to the same place, same room, and different room conditions. Participants in the same place and different room conditions remembered the same amount of words ($M = 6.39$) with those recalling in the same room condition remembering slightly more ($M = 7.61$). A one-way ANOVA on the averages found no significance in the data, $F(2, 51) = 0.91$, $p = 0.41$, showing that participants recalled the same amount of information in their original environment as they did when they moved to a different one.

A Sense to Remember: Seeing and Touching are Better than Hearing

Amanda Shackleton, Jessica Garris, Michael Naquin & Shakeria Alcorn

Research Advisor: Dr. Amy Hammond

Department of Psychology
Centenary College of Louisiana

Participants were presented with 21 words in one of three modalities—auditory, visual, or tactile. After a brief distraction task, participants recalled as many words as possible. Recall was significantly better for items presented in tactile and visual modes than for items in the auditory mode. College-student participants were presented with 21 words in one of three modalities—auditory, visual, or tactile. The name of the object was read aloud, a photograph was shown, or the object was placed into the participants' hands (behind their back) for five seconds. Participants experienced seven different objects in each of the modalities presented in random order. After a brief distraction task, participants recalled as many words as possible with no time constraints. Participants recalled more names presented in the tactile and the visual modes than in auditory mode ($F(2, 45) = 13.46, p < .00003$). These results support the idea that object names are memorized best via non-auditory modalities. The role of individual learning styles in memory is suggested as a possible interpretation of these results and future work will explore this link.

Social Science and Humanities Oral Presentations

A Soldier's Journey: The Diary of a World War II Veteran

Molly Adkins

Department of History and Political Science
Centenary College of Louisiana

Bringing you only a glimpse into the world of a World War II soldier, Goodloe Stuck was a resident of Shreveport, La. when he was called to serve overseas. He was part of the 44th Engineer Battalion, who was sent to provide relief for other American infantry during the Battle of the Bulge. Ultimately, Stuck was captured by German officials in late December of '44. He was sent to a German prisoner camp, where he and other men would reside until the wars end. It was there he kept a diary of the events leading up to his capture, how he and the other men survived the camp, and their camp's liberation and return to the United States. His story provides evidence as to why it is important to keep the memory of these veterans alive, as it is now up to our generation to preserve them.

The Two Faces of Muhammad Abd al Wahhab

Catherine Walsh

Research Advisor: Dr. David Otto

Department of Religious Studies
Centenary College of Louisiana

Abd Al Wahhab is often portrayed as a puritanical extremist whose theology and worldview contributed to the current Islamic fundamentalisms witnessed today. Scholars debate about the man himself and paint opposing portraits of his life and writings. How does the interpretation of Wahhab's life and writings lend themselves to these opposing characterizations of the man? Some view Wahhab as part of the eighteenth century revivalist movement; while others characterize him as a continuation of puritanical extremism. Both portraits of Wahhab will be juxtaposed, and his theological writings concerning Oneness of God (*tauhid*), heresy (*kufr*) and associating partners with God (*shirk*) will be addressed, as these form the foundations of his written word. This debate concerning the theology of Wahhab is essential in understanding the fallacy of these opposing portrayls. These categories thrust upon Wahhab are blurred: He was a revivalist of the eighteenth century who intrinsically held puritanical beliefs.

College Choice Behavior for the Small, Private, Liberal-arts Institutions of Higher Education

Wes Carlisle & Dr. Elizabeth Rankin

Frost School of Business
Centenary College of Louisiana

In 1999, DesJardins et. al. point out that college choice studies have become increasingly important within the realm of enrollment management. Using data collected under cooperation of Centenary College of Louisiana, the goal of this paper is to discover significant predictors of college choice behavior. The dependent, dichotomous variable represents the decision of an accepted student to enroll in the small, private, liberal arts institution. The forty-four variables discussed come from nine distinct groups, as follows: demographics, application, application status, academic interests, merit, influence, financial aid, visits, and communication. Logit is used to determine enrollment odds using the explanatory variables mentioned above. As studies of this nature have evolved over time, the understanding of college choice behavior has become more precise. Several variables that are discussed previously in the primary literature are included, and the results from this paper generally coincide with the prior findings. For example, it is well known that as the ability of an applicant increases, the applicant becomes less likely to enroll in a single institution. Interestingly, the data suggest that applicants with religious affiliation may not be more likely to attend a religious institution. The paper also confirms the high-yield attribute of certain admissions-hosted events.

An Investigation into the Characteristics of FOMC Members and the Predictability of a Dissenting Vote

Manoah O'Dell

Frost School of Business
Centenary College of Louisiana

Twelve individuals make up the Federal Open Market Committee. At the end of each meeting, members are asked to cast a vote either for or against proposed monetary policy actions. Should these individuals vote in unison because they already know what and when monetary policy is best to be implemented? Or is there room for dissension, opinions, and preferences in the decision to implement monetary policy? Do certain characteristics of the members have explanatory power in predicting dissenting votes? This paper investigates the characteristics of members that vote for and against proposed monetary policy at Federal Open Market Committee meetings from January 1991 until January 2011. Dissension could become a powerful tool for indicating the preferences of those who make up the committee. This investigation indicates that being female, the Chairmen of the board, and working with the government before joining the committee lead to a decrease in the likelihood of members to cast dissenting votes against the proposed monetary policy at these meetings. The older members are when they join the committee and the more time spent on the committee increase the likelihood of casting a dissenting vote.

Integration of mathematical approaches into the cell biology curriculum Oral, Social Sciences, Education – Biology – Mathematics

Wes Carlisle, Dr. Mark Goadrich[1], & Dr. Cynthia Brame[2]

[1]Department of Mathematics
[2]Department of Biology
Centenary College of Louisiana

In 2006, the National Science Foundation called for greater integration of mathematics into the biology curriculum. We have developed two modules that can be incorporated into Cell Biology classes to increase student understanding of the utility of mathematical techniques for understanding biological phenomena. In the first module, students learn to use a computational mathematics technique termed dynamic programming to determine the best alignment for DNA sequences. The students then use Basic Local Alignment Search Tool (BLAST), which makes use of an algorithm based on dynamic programming, to identify a DNA sequence. Forty-nine students in three sections have completed the module. Assessment indicated that learning goals for the module were met, with all three student sections surpassing benchmarks. In the second module, students explore the dynamics of the ubiquitous cytoskeletal filament actin. The instability of this molecule is important for its participation in cell motility and cell division. Actin elongation follows a pseudo-first-order rate law, which is expressed mathematically as a first-order differential equation. A homework exercise guides students through derivation of a mathematical model to describe important features of actin. The module will be integrated into and assessed in Advanced Cell Biology in 2012.

The mini-mental-status exam and Alzheimer's disease

Renée Do

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Alzheimer's disease involves a deterioration in cognitive skills, among other things. The mini-mental status exam (MMSE) is a test created in the 1970s and is used across clinics in America to aid in the diagnosis of Alzheimer's disease and other forms of dementia. Although this use is common, the MMSE has never been validated to clearly distinguish between those with Alzheimer's and those without. I had planned to compare the scores on the MMSE of a group of Alzheimer's patients with the scores of Centenary students, but I learned that gaining access to Alzheimer's patients is very difficult. Instead, I investigated the neurobiology and the treatment of Alzheimer's disease in more detail, the history of the MMSE, and also compared the scores earned by Centenary students and professors on the MMSE.

Bipolar Disorder and Schizophrenia

Sean R. Brazeel

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Bipolar disorder is a mood disorder characterized by emotional highs (mania) and lows (depression). Kay Redfield Jamison is a clinical psychologist who studies this disorder and also suffers from it herself. In her books *An Unquiet Mind* and *Touched with Fire: Manic-Depressive Illness and the Artistic Temperament*, Jamison explores several themes, including the observation that this disorder seems to run in families in which creative artists are common. I investigated these ideas in relation to contemporary artists like Daniel Johnston and Roky Erickson, who are diagnosed with bipolar disorder and schizophrenia, respectively. Two things that I have learned are that schizophrenia and bipolar disorder have overlapping symptomology and that treatments for either disorder tend to temporarily eradicate symptoms while the underlying neurobiological problems remain unsolved.

Use of eye-tracking technology in examining cognitive processes

David Micinski

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This presentation will cover three investigations of cognitive processes using eye-tracking equipment. Each was designed to test the usefulness of the eye-tracking equipment in future research. Each participant was calibrated to the machine and completed two of the experimental tasks. The first investigation looked at reading ability in normal sentences vs. sentences with transposed letters and measured differences in fixation points and regressions during reading. The second investigation examined visual search strategies on a memory task by manipulating the instructions given to participants prior to the task. The final investigation looked at social stereotypes and their impact on decision-making. Across the 3 tasks, visual search strategies were examined to differentiate cognitive processes.

Grief Counseling

Aurora Owen

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Grief is a natural part of everyone's life, but people deal with grief very differently. In this project I investigated different theories and approaches to grief counseling and also volunteered at Hospice to gain practical experience. I plan to build upon this research in graduate school and become a grief counselor.

Animals Decoded

Megan Webber

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Animals intrigue people: they are our friends, they entertain us, and they can function as replacement offspring, among other things. I explored the use of animals in psychological therapy and investigated background information on some species that especially interest me, including dogs and orangutans. This project has enhanced my understanding of the possible relationships between man and animal.

Video Games to the Rescue: Exploration of Video Games as Stress Relievers

Alicia Ivanic

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Results from a previous study have indicated that playing violent video games significantly reduce stress levels. This study investigated why there was a significant reduction in stress in the earlier study. Previous research has shown that video games can be used to meet psychological needs, such as autonomy, competence, and relatedness, which can potentially be beneficial to a person's welfare (Pryzbylski, Rigby & Ryan, 2010). The current study examined whether or not these needs interacted with video game violence to produce the reduction in stress. After being stressed, participants played a violent video game or a non-violent video game. In addition, we measured several psychological needs and their stress level.

Dance Therapy

Laila Al-Dubais

Research Advisor: Dr. David Stafford

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Dance therapy is one example of what are called expressive therapies; others are play, sand, and drama therapy. I have researched the history of dance therapy, the different forms it takes, and the pros and cons of this type of treatment. My investigation has persuaded me that dance therapy can have powerful effects in peoples' lives.

Implicit Alcohol Priming and Ambiguous Behaviors

Jeff Schaffert

Research Advisor: Dr. Matthew Weeks

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Previous research has indicated that alcohol has been associated with a negative valence. Other research has also indicated that subliminal priming has had an impact on behavior and more specifically drug behavior. The aim of this study was to evaluate the impact of a subliminal alcohol prime on interpretations of ambiguous behaviors. We hypothesized that because of the negative valence of the construct, the subliminal prime activating the construct would lead to a negative interpretation of the ambiguous behaviors.A series of either control or alcohol primes were subliminally presented to students followed by multiple vignettes of ambiguous behaviors. The students were

asked to indicate whether they interpreted the behavior as negative or positive. Students also filled out a quantity frequency measure of alcohol consumption over the last two weeks, predicting that the construct in the heavier drinkers would be primed more easily and thus leading to more negative interpretations.

Memory of Emotion Words: Which Sticks Out More: "Kill" or "Sex"?

Tuaneeta Shears

Research Advisor: Dr. Amy Hammond

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Though the human brain is capable of processing and storing vast amounts of information, certain topics can prove more memorable than others. For example, when presented with sexual or neutral content and later asked to recall the material observed, sexual information is more likely to be recalled (Corbeil and McKelvie, 2008). Studies have shown this to be true even when presenting sexual content with negative content; both of which are arousing and more likely to be remembered over neutral material. This study adds the fourth distinct category of sensual to determine if words related to sex in a lesser sense are still just as memorable as sexual words or at least more memorable than negative and neutral words. In addition, this study explores more subtle influences of learning these word lists by presenting subjects with anagrams that can be unscrambled into either a neutral or sexual word such as ipesn into spine, pines, or penis. By adding this variable, it can be better determined which category is easier to not only recall but also identify from arbitrary letters.

Ideological Emancipation: Toward the Study of Lesbian and Gay Muslims' Identity Reconciliation.

Brandon Sepulvado

Department of Sociology
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In the United States, Muslims not only must cope with stigma attached to their religious identity, but some Muslims also face yet another stigma—their sexuality. These individuals often experience their spirituality and sexuality as contradictory, and they must find a way to reconcile the two. The current project seeks to investigate this reconciliation process. To begin to study the negotiation many gay Muslims experience, I examine individuals in a similar scenario—gay Christians. A review of existing literature on gay Christians provides a lens through which to view the methods individuals within a dominant religion utilize to integrate their religion and non-dominant sexuality. This literature sets the stage for an examination of an identity reconciliation process that spans two stigmatized identities—gay and Muslim. Contrasting the identity work of gay Muslims with gay Christians will help isolate the effect(s) of a second non-dominant, stigmatized identity on an identity negotiation between spirituality and sexuality. This presentation showcases the basis for an ongoing investigation into what it means to be gay within an Islamic context.

NATURAL SCIENCE ORAL PRESENTATIONS

PRO-INFLAMMATORY GENE UP-REGULATION DEPENDENT ON P-38 MAP KINASE IN AGE RELATED MACULAR DEGENERATION

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Cyclooxygenase-2 (COX-2) catalyzes the synthesis of prostaglandins and is a pro-inflammatory effector as well as a regulator of cell functions. Several eye diseases, including diabetic retinopathy, glaucoma, and age-related macular degeneration, involve pro-inflammatory signaling. Upregulation of COX-2 by the pro-inflammatory cytokine interleukin-1β (IL-1β) and Lipopolysaccharides (LPS) have been reported. Previous report from this laboratory has established that the 830 bp containing Cox-2 promoter construct linked to a luciferase reporter gene is upregulated by IL-1β and that a 50nM concentration of lipid mediator neuroprotectin D1 (NPD1) inhibits Cox-2 promoter gene expression near control levels. In the present study we investigated the involvement of P-38 MAP kinase (MAPK) in pro-inflammatory gene expression in retinal pigment epithelial cells (ARPE-19). We have found that ARPE-19 cells, pre-exposed to a P-38 MAPK inhibitor SB203085 was unable to upregulate COX-2 induction induced either by IL-1β or LPS implicating the role of P-38 MAPK in cell signaling. We also demonstrated that NPD1 and SB203085 inhibited the IL-1β and LPS induced COX-2 expression in 830bp COX-2 promoter transfected RPE cells. In addition we have found that two other anti-inflammatory lipid mediators derived from arachidonic acid (Lipoxin A4, 15-epi-Lipoxin A4) were unable to inhibit the expression of Cox-2 at low concentration. However at very high concentration (5X) Lipoxin A4 and 15-epi-Lipoxin A4 were able to inhibit COX-2 expression close to 50%. Moreover NPD1 and SB203085 inhibited the P-38 MAPK phosphorylation induced by IL-1b and LPS. These results identified the role of the P-38 MAPK phosphorylation in IL-1b mediated cell signaling pathway in ARPE-19 cells.

Pulmonary Arterial Hypertension: Clinical Correlation with Reduced Lung Lymphatic Vessel Density. Significance and Interpretation.

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Pulmonary arterial hypertension (PAH) is a progressive lung disease of unknown etiology characterized by increased pulmonary arterial pressure with obstructive changes in lung vascular structure. Currently the role of pulmonary lymphatics in PAH, and whether lymphatic reorganization takes place during PAH is unknown. We investigated lymphatic remodeling in the pathophysiology of human PAH. H&E staining and immunostaining of archival paraffin sections of control and PAH-derived lung specimens were administered for the lymphatic specific marker D2-40 (podoplanin). A comparison of lymphatic vessel numbers and sizes in these specimens showed an overall decrease in the number of lymphatics ($p=0.023$) but an increase in the size of the vessels ($p=0.0576$). We also examined how inflammation-induced lymphatic dysregulation was influenced by cytokines. Since lymphatic endothelial VEGF receptor-3 controls lymphatic abundance and integrity, we examined its expression in response to IFN- , IL-1 and TNF- . Our results show that IL-1 decreased VEGFR-3 at all doses. These findings suggest that patients with PAH may have fewer, but larger lymphatics which contribute to the disease. In addition, we hypothesize that accumulated immune cells and cytokines may provoke this remodeling via dysregulation of lymphangiogenic receptors.

CLONING AND IDENTIFYING AN UNKNOWN *IPL1* SUPPRESSOR GENE

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An important event in mitosis is when microtubules from each spindle pole attach to the centromere of a chromosome. This process is regulated by Aurora B, a conserved protein kinase encoded by the *IPL1* gene, and protein phosphatase type 1 (PP1), encoded by the *GLC7* gene. In an attempt to identify PP1 regulators that act in this process, UV mutagenesis was used on yeast with a temperature-sensitive *ipl1-2* mutant, and a suppressor screen was done. The Rev8 strain was found which displayed growth that suggested some interaction between the *rev8* mutant protein and Aurora B. Fluorescence microscopy was used to study spindle formation/length in the different strains. The results implied that the spindle assembly checkpoint may have been triggered in the mutants which would slow mitosis. To identify the mutation, the Rev8 strain was transformed with plasmids from a genomic library. The suppressor gene was cloned using complementation of the *rev8* slow growth defect and formamide sensitivity. After isolating and sequencing the plasmids, each one contained the *NDC80* gene which encodes a protein that is a direct target of Aurora B and a central component of the kinetochore. A point mutation in *NDC80* was the only change in the gene.

DESCRIPTION OF A NEW SPECIMEN OF *ICTIDOSTOMA HEMBURYI* (THERAPSIDA; THEROCEPHALIA) AND THE PHYLOGENETIC RELATIONS OF THEROCEPHALIANS TO THE MAMMALIAN LINEAGE

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Synapsida is the clade of vertebrates that includes all amniotes more closely related to mammals than to reptiles and birds. In the Middle Permian, a group of dog-like, primarily carnivorous synapsids, called therocephalians, appeared, followed in the early Late Permian by a distinct yet similar group with varying carnivorous and herbivorous forms, called cynodonts. There has been debate as to whether Cynodontia, which includes Mammalia, lies within Therocephalia. Using computed tomography techniques, a new, almost complete therocephalian cranium is described from the Upper Permian deposits of the Karoo Basin, South Africa. The presence of a large septomaxilla, narrow rostrum, and posterior processes of the nasals tentatively ally it with *Ictidostoma hemburyi*. A phylogenetic analysis yielded an exclusive clade

between the new specimen and *Ictidostoma*; however, the analysis placed *Ictidostoma* at the base of a clade composed of Whaitsiidae and Hofmeyriidae, supporting previous studies that have found *Ictidostoma* to be a basal whaitsioid. Therocephalia was found to be monophyletic, but with a weak bootstrap value; however, a Therocephalia paraphyletic to Cynodontia was found to be highly unparsimonious, requiring numerous reversals to the plesiomorphic therapsid condition, and current data supports the position that cynodonts evolved from basal eutheriodonts, not whaitsiid therocephalians.

In Vitro Brain Microparticles Release of Full-Length Amyloid Pre-Cursor Protein in Response to Inflammatory Stimulants by Human Brain Endothelial Cells

Erica Glidewell, Walter Cromer, PhD[1], Merilyn Jennings[1], Alireza Minagar, MD[2], Chaitanya V Ganta, PhD[1], Trevor Castor, PhD[3], & J. Steven Alexander, PhD[1]

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Alzheimer's disease (AD), a CNS disorder characterized by progressive dementia /cognitive decline is mediated by beta-amyloid deposition and inflammation. The AD 'amyloid hypothesis' proposes deposition of insoluble amyloid-β as the route cause of neurodegeneration. The 'vascular hypothesis' of AD suggests AD originates in part from impaired cerebral perfusion triggering accumulation of β-amyloid. Western blots of human brain endothelial cells (HBMECs) and their released microparticles (MP) under normal and 'inflamed' conditions were used to study Amyloid Precursor Proteins (APP) and its derivatives produced in a model of AD. We report for the first time that 3 APP-reactive bands (150, 130 and 40 kDa) are present in HBMEC; 130 kDa APP is found only in MP. Analysis of APP abundance bands in HBMECs shows that inflammatory factors, tumor necrosis alpha (TNF-α) and interferon-g (IFN), significantly reduce ($p=0.0004$, $p=0.0070$) full-length APP precursors in HBMEC. Full-length APP in microparticles was not significantly decreased. Because previous experiments show TNF/IFN treated HBMECs release 3X as microparticles as controls, we conclude that HBMECs release full-length APP via MP production during inflammation. The fate of MP-APP released by brain EC is not yet clear but could participate in the etiology of AD, MS and stroke injury.

Analgesic Interactions and Sex Differences of Oxycodone and the Endocannabinoid System

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Oxycodone is a powerful analgesic opiate prescribed for pain management; however, like with other opiates, nausea, tolerance, and dependence are all aversive side effects of this drug class. One potential method of counteracting these aversive traits is by manipulating the endogenous cannabinoid system through the drug LY2183240, which increases overall anandamide by blocking degradation and reuptake. We hypothesized that LY2183240 would potentiate the antinociceptive response, a reduction in pain sensitivity, of oxycodone for both male and female rats. In a within-subjects design, the hot plate method was used to test for supraspinal antinociception, recording latency time when the subjects lick their hind paws indicating perception of a painful stimulus. For female rats, LY2183240 did not significantly differ in antinoceptive response from the control and it did not potentiate or interfere with the antinoceptive response of oxycodone. For male rats, LY2183240 had a significant treatment effect of antinoceptive response from control, and it did not potentiate but did interfere with the antinoceptive response of oxycodone. We concluded that there is an inverse sex difference in the sensitivity of analgesic response to both oxycodone and LY2183240 which could indicate sexual differentiation of the endogenous opioid and cannabinoid systems.

Rapid quantitation of gases in microliter sized fluid samples

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[2]Innovative Resuscitation Technologies

Gases and other volatile species participate in many biological processes, and they thus directly impact the health of organisms. Studies of these species to determine their significance in various metabolic processes can be difficult to conduct, since these species can be low in abundance and are partitioned in different ratios in compartments such as proteins, cell membranes, and cytoplasm. An apparatus and technique involving mass spectrometry were developed to rapidly identify and quantify gases in small fluid samples. This process is able to directly measure the quantity of a species in a fluid sample, requiring no mathematical inferences or models for quantification. The method offers several advantages, namely its ability to identify in several minutes the presence of picomoles of gases from fluid samples as small as

20μL. The method's utility is demonstrated through the reproduction of literature values of atmospheric gas solubility constants in water. The method's use is demonstrated for mixed fluids through the quantification of gaseous species in an oil emulsion and in mouse blood.

Characterization of resins used in paper coating by dynamic light scattering

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Resins can provide coatings for paper with various degrees of protection. The particle size distribution of these resins can be used as a quality control measure among batches in the manufacturing process. In this study, eleven resin samples were characterized by dynamic light scattering. The concentrations of the resins were adjusted to optimize the scattering signal. For some samples, dilution with water was required whereas others required further concentration. Reliable size distribution data are given for samples for which optimal conditions were obtained.

Perfluoroalkylation of C-H bonds in arenes with carboxylic acid and trialkylamine functionalities

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Trifluoromethyl groups impart additional stability and lipophilicity to aromatic components of pharmacologically-active compounds. In spite of significant effort, few user friendly methods exist to add these functional groups to molecules with potential biological activity. We have previously reported a benchtop procedure for arene-limiting perfluoroalkylation. We sought to extend this procedure to the perfluoroalkylation of structurally complex arenes with carboxylic acid and amine functionalities, specifically analgesics. The carboxylic acid functionalized arenes investigated include ibuprofen, naproxen, acetylsalicylic acid, and acetaminophen. A perfluoroalkylated ibuprofen analogue was synthesized in one step and purified by a selective extraction process. One isomer of the product mixture was purified and used for *in vivo* analgesia studies along with the isomeric product mixture, both of which displayed analgesic activity. An ester protected form of naproxen was functionalized in a higher yield than was observed using the carboxylic acid form. Although acetylsalicylic acid and acetaminophen could not be functionalized, a methyl ether protected form of acetaminophen could be perfluoroalkylated and separated into isomers. Deprotection to give the perfluorobutyl acetaminophen has not yet been realized. The perfluoroalkylation of lidocaine demonstrated that selective functionalization of aromatic C-H bonds is readily accomplished in the presence of trialkylamine groups.

SYNTHESIS OF ARCHAEAL-TYPE PHOSPHOLIPIDS WITH VARYING ALKYL CHAIN LENGTHS

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Bolalipids, or archaeal-type phospholipids, are unique materials which form fluid lamellar-phase membranes with enhanced stability over membranes formed from more conventional monopolar phospholipids. This enhanced stability presumably comes from 1) an ether-linkage between the glycerol backbone and the hydrophobic region of the lipid and 2) the presence of transmembrane spanning alkyl group(s). Bolalipids have demonstrated potential in applications such as lipid membrane-based biosensors, drug-, gene- and vaccine delivery vehicles, and as molecular fossils. *Despite* some recent advances; the structure-function properties of bolalipids are poorly understood. The progress towards the synthesis of two bolalipids, C_{16}BAS and C_{24}BAS, are reported. These compounds will be evaluated to help elucidate the effects of alkyl length on the physical properties of the resulting membranes. Similar synthetic strategies used to synthesize the previously generated bolalipids, C_{20}BAS and C_{32}BAS, are employed.

COLLIDING GALAXY SIMULATIONS

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Galaxy collisions take millions of years to fully play out, making them hard to observe. With the use of cluster computer systems and super computers scientists can now simulate the collisions in a more manageable time frame. The following presentation presents the building of a computer program that will simulate galaxy collisions. The techniques being used in the program are: predictor-corrector methods of analysis, the use of Beeman's algorithm, linear algebra formatting, and the use of N-body modeling to convert the galaxies into a collection of discrete bodies. The programming language Python with the VPython library was used to write the code. The code was written in three phases corresponding to the three dimensions to reach the final simulation.

DESIGN AND CONSTRUCTION OF A TAIL FLICK ANALGESIA METER

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Drugs are continuously developed for pain relief in humans. Before commercial availability they must be tested for toxicity and effectiveness in animals. One test for effectiveness is the tail flick experiment. The goal of the

research is to develop an inexpensive tail flick analgesia meter by simplifying the current implementation and using an Arduino interface. Our design is one-hundred times cheaper than the current analgesia meters on the market and works in a similar fashion. This meter will give Centenary faculty and students the ability to accurately determine the pain threshold in mice using different medications.

AMYLOIDOGENESIS RATE OF ALPHA-LACTALBUMIN III IN THE PRESENCE OF HYDROPHOBIC PARTICLES

Francis J. Petitto & Dr. Troy C. Messina

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Alzheimer's disease is an amyloid-implicated progressive mental disease causing cumulative dementia and eventually leading to death. Although there are hypotheses surrounding the kinetics of amyloid formation, its mechanism and driving force remain largely unresolved. The presence of a hydrophobic surface induces the conversion from non-pathogenic, unordered monomeric protein forms to neurotoxic amyloid polymer conformations. In this present work, we display the effects of systematically varying the surface area of hydrophobic particles to observe resulting kinetic effects on amyloidogenesis rates of a model protein, bovine α-Lactalbumin III, using fluorescence spectroscopy.

INTEGRATED PYTHON SERVER FOR ANALYSIS OF PHOTOELECTRIC DATA

James Riley & Dr. Troy C. Messina

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The motivation behind this project was to further uniformity in analyzing data in a quickly evolving scientific world while making the analysis components public. Having a public analysis gives the ability to store the massive amounts of data from all the users allowing for a more efficient analysis. The problem is that there is no publicly accessible way to analyze the data in a quick and easy way. We looked at a variety of ways to analyze the data using server applications to run through the data using an off server program. This method was too complicated to pass information from the server to an off server program. Instead, we integrated the programming language onto the server. The language used was Python due to being able to integrate it with the server easily and the modifications of the language are free to use. What resulted was a web server that had the capability to analyze time dependence fluorescence. Further research into the project will go towards expanding the server to encompass different forms of analysis.

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